Intergenerational class mobility in Britain: A comparative look across three generations in the Lothian Birth Cohort 1936

Intergenerational Class Mobility in Britain: A Comparative Look Across Three Generations

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Abstract

The Lothian Birth Cohort 1936 sample is in a uniquely good position to provide relevant data on social class mobility patterns over most of the last century. These participants, with known ultimate social class attainment, took a validated mental test in the Scottish Mental Survey of 1947 and were followed up at approximately age 70. Then, besides their own age 11 mental ability data and educational and occupational attainment, they reported educational and occupational data on their parents and offspring. We constructed structural equation models of participant and offspring social class attainment and odds of social class movement, and compared results with those from the similarly recruited and assessed Lothian Birth Cohort 1921. In the 1936 cohort, relative transmission of social class from one generation to the next decreased, while relative transmission of educational attainment increased. In addition, effects of childhood IQ and educational attainment on social class decreased, apparently due to relative decrease in overall upward mobility and absolute increase in overall education level.

Social class attainment and thus social class mobility are of importance to psychologists. Social class attainment indicates current access to material things, educational and financial opportunities, and healthful environments. But it also indicates degree of relative social status or ranking within the social hierarchy, and the associations with power and dominance that such rankings entail. Social class mobility indicates the extent to which these social goods are accessible based on personal psychological characteristics such as mental ability and willingness to invest effort, in particular in educational attainment. Of course, greater social mobility also implies that these social goods may be denied to those who do not demonstrate the psychological characteristics requisite for higher social class attainment. This suggests that, while low social status attainment may be associated with less absolutely healthy environmental circumstances (Marmot, et al. 1991), some of the stressful and deleterious effects of low social status may also be relative: those who are at the bottom of the social hierarchy may suffer compared to those above them simply because of their relative social position, regardless of the absolute degree of adversity they experience (Adler, et al. 2000). To the extent that this is the case, it is reasonable to question whether, at the population level, the psychological consequences of low social status are not in fact worse than the physical consequences of low social status. Nevertheless, whether greater social mobility is to be accepted as a good in itself or subject to further scrutiny in this regard, we can only begin to evaluate it by examining the status attainments and movements of individuals across social status classes over an extended period of time.

General associations between mental ability and educational attainment and social class status have been documented in many studies, most of which have been carried out in Britain and the United States (Strenze, 2007). The first studies confirmed that mental ability or IQ tended to be stratified by social class, though there was also considerable variation of IQ within each social class (Bajema 1968; Burt 1961; Duff & Thomson, 1923-24; Higgins 1961). More recent longitudinal studies have largely replicated these findings regarding status attainment (Strenze, 2007). There are of course many possible mechanisms through which an association between IQ and social class could arise. They are not mutually exclusive, making distinction among them difficult. Parental social class may contribute directly to the development of offspring IQ through better environmental conditions and/or health; ability may contribute directly to the attainment of education, which in turn makes possible social class attainment; parental social class may make educational opportunities possible, which in turn open occupational possibilities; ability may contribute directly to social class attainment regardless

of education; parental ability that contributed to parental social class status may be transmitted genetically to offspring with no specific leverage to the offspring from social class of birth; etc.

Social class attainment should be distinguished from social class mobility, or the potential for individuals to move from the social class of their births to some other social class in adulthood, based on their own achievements. The very existence of associations between characteristics in the individual and social class attainment implies some likely degree of social mobility, but mobility can be greater in one direction than another, and any individual difference characteristic transmitted in its entirety from parent to offspring would also show this kind of association. Social mobility is often considered an important indication of the openness of a society, and of the extent to which social class attainment, and the economic and social benefits that go with it, are distributed based on individual merit rather than social connections and inherited position and wealth. It is also often considered an indication of economic growth and improvement in standard of living for a population. It is, however, more complicated to think of social mobility in this manner. In the absolute, social mobility entails the potential for downward as well as upward social movement, and the existence of substantial downward social mobility is inconsistent with any link to economic growth. More importantly, social class attainment is to some degree a relative concept: in addition to access to material resources, it involves reference to a status hierarchy in which some people are of higher education/income/status than others. While, in the ideal, everyone in a society could have clean and safe environments, good schools, and access to nutritious food, competent health care, and constructive entertainment, not everyone can be at the top of any status hierarchy.

Early studies of social mobilityshowed evidence that it was ability-driven, in that sons with lower IQ's than their fathers tended to have lower social status than fathers, and vice versa (Burt 1961; Gibson 1970; Higgins 1961; Jencks 1979; Waller 1971; Young and Gibson 1963). Jencks (1979) noted that mental ability predicted educational attainment, which in turn predicted occupational attainment, suggesting that educational attainment was the means through which ability made social mobility possible. This can especially be the case during times when educational opportunities are expanding, particularly if the educational opportunities involve little financial cost to the individual. More recent longitudinal studies have largely replicated these findings regarding both status attainment and the potential for social mobility (Strenze, 2007). For example, Herrnstein and Murray (1994) reported that, in the National Longitudinal Study of Youth 1979 (NLSY) in the United States, parental social class only very partially mediated substantial associations between adolescent aptitude test scores and measures of poverty, education, marriage, welfare dependency, children's health, and crime

assessed 10 years later, suggesting the existence of substantial potential social mobility. Korenman and Winship (2000) re-examined these data by comparing sibling pairs to control more completely for family background. They agreed that individuals' own abilities were primary predictors of these outcomes, but also pointed out that contributions from family background and educational attainment were important, indicating that social mobility could also be constrained, as when minimal family resources limit educational opportunities. Richards and Sacker (2003) obtained very similar results in the 1946 British Birth Cohort. Hart, et al.'s (2004) findings suggested that upward social mobility was enhanced when parents were able to help provide their offspring with higher education even when the parents had not been able to attain higher social class themselves. Breen and Goldthorpe (2001) used the National Child Development Study's 1958 birth cohort in Britain to conclude that greater merit was required to move up from lower class backgrounds than from higher class backgrounds. Saunders (2002) used the same data to show departures from purely merit-based social movement resulted mostly from individuals of relatively low ability who managed to retain the middle class status to which they were born. Nettle (2003) also examined social mobility relative to class of origin in these data, concluding that relative mobility did not differ by class of origin. The different conclusions from this same dataset may reflect different ways of treating the substantial and non-random loss to follow-up over time in the sample (Nettle, 2003).

These studies addressed the potential for social mobility in important ways, and they have helped to establish the potential for and contributors to social mobility, despite continuing limitiations on its extent. They have not, however, done anything to address the *relative* potential for social mobilty, or the extent to which the potential for social mobility has changed over time. This is important because it is one measure that many consider an indication of social progress. Several studies have established that upward social mobility surged in Britain during the perhaps 30-year period following World War II (Blanden, et al. 2000; Breen and Goldthorpe 2001; Goldthorpe, Llewellyn and Payne 1987; Goldthorpe & Mills, 2004; Johnson, Brett and Deary 2009), likely due to economic recovery, growth of the technological and service industries, and relative decline of heavy industry at least as a source of employment. More recent data have indicated that this surge in upward social mobility has leveled off (Goldthorpe & Jackson, 2007; Goldthorpe & Mills, 2004). These data have not, however, addressed how these trends may have impacted the roles of psychological characteristics in contributing to whatever social mobility exists. For example, in times of economic growth and expansion of job opportunities in service and technology, mental ability could become more important to educational attainment if admission to higher education is based strongly on test scores and prior achievement, and less important if admission to

higher education is based on financial resources. Similarly, educational attainment could become more important to occupational attainment if occupational opportunities are strongly dependent on presentation of educational credentials, and less important if demonstration of relevant skills is more important than formal educational credentials. One likely scenario is that, in times when higher social class job opportunities are expanding, mental ability may initially increase in importance to social class relative to educational attainment, due to a relative shortage of people with educational credentials. With the expansion of educational opportunities, however, the reverse may be the case, and mental ability may decrease in importance relative to educational attainment.

We have argued that educational attainment is one of the primary means through which individuals of high mental ability can achieve upward social mobility (Johnson, Brett, & Deary, 2009). We have also argued that educational attainment can help to hold in place individuals born in higher social classes who have lower levels of mental ability. These processes can be slow: Deary, et al. (2005) noted that childhood IQ was a much stronger predictor of midlife social class attainment than of the social class of first occupation in young adulthood at least partly because some individuals return for additional education after some period of years in the workforce. This makes it difficult to assess the extent of current mobility in any society and suggests the importance of a long historical view. At the same time, it emphasizes the importance of considering the roles of these psychological characteristics in any discussion of social mobility.

Unless studies are designed specifically to test hypotheses of this kind, they can be extremely difficult to falsify because mental ability, educational attainment, and social class attainment and mobility all tend to be positively correlated. And, given the planning and lead time necessary to mount the data collection efforts required by such studies and the fact that trends of these kinds are often only recognized *after* they have occurred, such studies are very rare. Most studies that have examined social mobility and its trends over time have made use of samples gathered for a variety of purposes that involve use of social class data. This study is no exception. In such situations, the best that can be done is to document associations more consistent with some explanations than with others. This is still of value in developing understanding of patterns of social mobility and their associations with psychological variables.

The first purpose of this study was to consider the roles of the psychological characteristics of mental ability and educational attainment in both social class attainment and social mobility in the Lothian Birth Cohort 1936 (LBC1936). Participants in this study, whose ultimate social class attainment is now known, also

participated in the Scottish Mental Survey of 1947 and we had access to their age 11 mental ability data. At initial assessment in the LBC1936, in addition to their own educational and occupational attainments, they reported educational and occupational data on their parents and offspring. They thus provided, in their own right, the possibility of examining social class attainment and mobility across three generations spanning much of the twentieth century and beginning of the twenty-first. As in previous studies, we expected that, within each generation, social class of birth, mental ability (as available) and educational attainment would predict adult social class attainment, but we were interested also in the extent to which these characteristics would predict social class attainment in subsequent generations. Few studies have been in the position to address this so we did not have specific hypotheses about this.

The second purpose of our study was to compare social mobility in these three generations with that of three older generations from the same geographic area. There is a smaller but very similarly assessed Lothian Birth Cohort 1921 (LBC1921) to which the LBC1936 could be compared. The LBC1921 cohort participated in the Scottish Mental Survey 1932 and was followed up with respect to social mobility when in their early age 80's. At that time, they reported their own educational and occupational attainment data and similar data on their parents and offspring. Analysis of the LBC 1921 data has been reported by Johnson, Brett, and Deary (2009). In making this comparison, we noted that the lives of the offspring of the LBC1921 corresponded roughly in time to those of participants in the National Child Development Study, which has followed the development of as many as possible of the infants born during a single week in Britain in 1958. Moreover, the lives of the offspring of the LBC 1936 corresponded roughly in time to those of participants in the British Cohort Study, which has similarly followed as many as possible of the infants born in Britain during a single week in 1970. As these two recent cohorts have provided the data for the most prominent economic and sociological studies of turn-of-the-century social mobility (e.g., Blanden, Goodman, et al. 2004; Blanden, Gregg and Machin, 2005), our data on the LBC cohorts also serve to supplement the understanding provided by these studies. We expected that our data would reflect the increased access to education and rising upward social mobility noted in those other studies through the 1980's. Consistent with those studies, we also expected that these trends may have moderated in our youngest generation. As conclusions about whether low social class of birth limits upward social mobility have been mixed even within the same data, we had no *a priori* hypothesis about this issue in these data.

Method

Participants

The Lothian Birth Cohort 1936 consists of 1,091 members, most of whom participated in the Scottish Mental Survey 1947 (SMS 1947; Deary et al, 2004; SCRE, 1949) at about age 11 and were living independently in the community, mostly in Edinburgh and the surrounding area, at the time of recruitment at around age 70. The SMS 1947 was conducted as a follow-up to the previous Scottish Mental Survey of 1932, and aimed to obtain a measure of the psychometric intelligence of all Scottish schoolchildren born in 1936 using the Moray House Test no. 12 (MHT). The results were compared with those of the previous Survey 15 years earlier in order to identify any change in the nation's IQ; there was a slight increase from the 1932 to the 1947 Survey (Deary, Whalley & Starr, 2009). In total, 70,805 children took part in the test, representing 94% of the population.

The majority of participants in the LBC1936 were recruited with the assistance of Lothian Health Board using the Lothian Community Health Index to identify individuals born in 1936, although some participants were recruited through existing participants or advertising. In total, 1,226 individuals were identified as being interested in and eligible for the study, of whom 1,091 attended the Wellcome Trust Clinical Research Facility in Edinburgh for assessment between 2004 and 2007, i.e. at around age 70. The assessment consisted of a number of cognitive tests, a comprehensive physical examination and questions about their health, occupation and lifestyle. At their Clinic visit participants were given a questionnaire to complete and return, which contained detailed questions about personality, quality of life, lifestyle and demographic background. This included questions relating to their parents' and offsprings' educational attainments, their parents' jobs at the time of the SMS1947, and their offsprings' current jobs. A more detailed explanation of the recruitment and assessment of the first wave of the LBC1936 can be found in Deary et al (2007).

Of the 1,091 participants who attended for assessment, 548 were male and 543 were female; 967 participants completed and returned at least part of the study questionnaire. In order to maximise the numbers available for analysis and avoid bias associated with family size, we used data only for each participant's eldest offspring. Among the LBC1936 participants, 921 completed all of the questionnaire, 826 provided usable data relating to their father's education, 960 provided their father's occupation, 965 provided data on their offspring, 823 reported their eldest offspring's years of education and 804 reported their eldest offspring's job.

Measures

Social class. Participants' social class was calculated using the Classification of Occupations 1980 (Office of Population Censuses and Surveys, 1980), as this coincided most closely with the peak of their careers. Social class derived using this classification consists of six groupings: I (professional occupations), II (managerial and technical occupations), IIIN (skilled non-manual occupations), IIIM (skilled manual occupations), IV (partly-skilled occupations) and V (unskilled occupations). However, to enable direct comparison of social class across the three generations and because of the small numbers of individuals in the lower two classes, social class was collapsed into four categories for the purposes of analysis: I (professional), II (managerial & technical), III (skilled) and IV/V (partly-skilled or unskilled). This also enabled comparisons with the LBC1921. Participants were asked to provide their highest status occupation. These were not necessarily the jobs that they held for the longest periods.

Women were also asked for their husbands' highest occupations. Unlike our previous analysis of the LBC1921 participants' social class (Johnson, Brett & Deary, 2009), we here included all participants in the LBC1936, both male and female. The historical period during which these participants were in the workforce was one of great social change, in which females played increasing parts in the United Kingdom's workforce, although they did not necessarily pursue careers to the same degree as men. For this cohort, we thought that it made sense to evaluate the effects on overall mobility of those in the workforce, but also to recognize that many either did not participate at all, or did so at a lower rate. Therefore, for men, we assigned social class based on their own reported occupations. For women, we assigned social class based on the higher of their own and their husbands' reported occupations, under the assumption that assortative mating for characteristics associated with social class attainment is reasonably strong (Vandenburg, 1972). Of the 543 women in the LBC1936 who provided occupational information, 267 (49.2%) were assigned social class based on their husbands' occupations whereas 276 (50.8%) were assigned social class based on their own occupations. Of these, 202 (37.2% of the total number of women) had a higher status occupation than their husbands, 25 (4.6%) had an equal status occupation, 38 (7.0%) were single and 11 (2.0%) did not provide occupational information for their husbands as they were divorced. The women assigned their husbands' social class had higher social class (1.94 vs. 2.53, SD = 0.69, standardised mean difference (d) = 0.86, $t(529) = 8.382$, $p < 0.001$), number of years of education (10.88 vs. 10.59, SD = 1.09, d = 0.26, $t(541) = -3.035$, $p = 0.002$) and IQ at age 11 (102.6 vs. 99.5, SD = 13.86, d = 0.22, $t(506) = -2.480$, $p = 0.014$) than those whose class was derived from their own occupations.

Table 1 shows the resulting distributions of social class attainment in the two sexes within the LBC1936. We excluded 21 participants from analysis – 9 men and 12 women – as their social classes were derived from occupations within the Armed forces, which are not assigned a class under the 1980 classification. When social class was represented by the full six categories there was a marked difference in the distribution which was especially noticeable in class III. Men were more likely to fall into IIIM and women into IIIN. This reflects the propensity for women to have taken on secretarial or administrative work and men to have taken on manual skilled occupations. It therefore appeared that our treatment likely improved the accuracy with which social class reflected the social class attainments these women would have achieved had they pursued full-time careers to the same degrees as their husbands. When we considered only four categories of social class, the difference in the distributions of classes between men and women remained statistically significant (chi-square = 27.896 on 3 df, $p < 0.001$).

The distributions in social class of the fathers' and offsprings' generations did not differ significantly between the two sexes.

Social class for the participants' fathers was derived from the participants' reports of their fathers' occupations using the General Register Office's Census 1951 Classification of Occupations (General Register Office, 1956), as this was the closest to the Scottish Mental Survey of 1947 and also coincided most closely with the likely peak of the fathers' careers. The 1951 Classification allocates individuals' social class into one of five groups: I, II, III, IV and V, along the same lines as that of the 1980 Classification.

The derivation of social class for the offspring of the LBC1936 participants was slightly more complicated than that used for the older generations. With the publication of the Standard Occupational Classification (SOC90; Office of National Statistics, 1990) in 1990, the classification of occupations in the UK was brought in line with those used internationally. The conceptual focus of classification in the new system is based on job skill level – as defined by the nature and duration of qualifications, training and experience required to complete the tasks associated with a particular job – and job content – the nature of the work activities involved. The SOC90 was further modified prior to the Census of 2001 to reflect changes in the labour market and in society as a whole. The resultant SOC2000 consists of nine major groups, each associated with a particular skill level and each containing three further sub-divisions. Every occupation in the SOC2000 has a four digit number, representing their position within the classification (ONS, 2000). This Classification was used for the offspring of the LBC1936 participants.

Since 2001, the classification of social class based on occupation has been superseded by the National Statistics Socio-Economic Classification (NS-SEC). Developed by researchers at the Institute for Social and Economic Research at the University of Essex, this classification focuses less on the skills required to complete a job and more on the employment relations involved, thus reflecting more accurately recent changes in the labour market in the UK (Institute for Social and Economic Research, 2009, ONS, 2007), in particular the growth of the self-employed sector. Of great benefit to considerations of intergenerational social mobility was the development alongside the NS-SEC of a technique for mapping NS-SEC categories back onto the Social Class categories of the earlier Classifications. This is done by the use of a lookup table to cross-reference the occupational category from the SOC2000, the size of the work place and the individual's employment status (employed, self-employed, or employee) to obtain the NS-SEC category, which is then matched to an appropriate Social Class (ONS, 2007). For the offspring of the LBC1936, the SOC2000 occupational categories were first obtained from the job title and description given by the participants using the Computer-Assisted Structural Coding tool (CASCOT) software developed by the Institute for Employment Research at the University of Warwick (Jones and Elias, 2007). Any discrepancies or inaccuracies in coding were corrected manually by the researcher (CB) before the SOC code was converted to first the relevant NS-SEC category and then the corresponding Social Class using the lookup tables provided by the Office of National Statistics. Although the information provided by participants about their offsprings' occupations was less detailed than that required for a full classification using the NS-SEC, the social classes assigned were checked manually and deemed to be sufficient to enable comparison between the participant and offspring generations, given the substantial changes that have occurred in the UK labour market in the last 20 years.

Educational attainment. Participants reported age at leaving full-time education and highest educational qualification. Participants also reported the number of years of full-time education of both of their parents and the number of years of education and highest qualifications obtained by each of their offspring. For the purposes of this study, only three variables were used: participants' calculated years of education, reported years of education for their fathers and reported years of education for the eldest offspring. We also calculated the difference between the participants' mothers' and fathers' years of education to reflect more closely the intellectual environments of the households in which the participants were raised.

Age 11 IQ. As previously mentioned, all participants in the LBC1936 were administered a version of the Moray House Test No 12 when they were aged 11 as part of the Scottish Mental Survey of 1947. The MHT is a

valid group-administered cognitive ability test consisting mainly of verbal reasoning items, though nonverbal items are included as well (Scottish Council for Research in Education (1949). The average score on this test for the members of the LBC1936 was considerably higher than that of the population as a whole, reflecting survival to old age, ability and willingness to participate in the research, and the demographic characteristics of the recruitment area (Johnson et. al, 2009, Hedden & Gabrieli, 2004). Age 11 IQ was calculated by adjusting the raw age 11 scores on the MHT for age in days at time of testing before placing all the scores on an IQ-type scale with a mean of 100 and S.D. of 15 within the LBC study.

Data Analysis

We fit a three-generation structural equation model to the data using Mplus version 5.2 (Muthen & Muthen, 1998-2006). Given the focus of the paper on social mobility and the temporal ordering of our variables, there was only one combination of paths that made conceptual sense, so the purpose of fitting this model was solely to estimate the magnitudes of the effects of the variables of interest on social class status in the three generations rather than to compare competing alternative models that could distinguish possible causal explanations for the associations. Many factors could possibly contribute to these associations, but we had no way to distinguish among them in these data. We fit the structural equation model using full information maximum likelihood estimation so that we could make use even of the small number of cases that had missing data for some of the variables[1]. Doing so relies on the assumption, reasonable in this case, that data were missing at random (Little & Rubin 1987)[2]. We reduced the complexity of the original model empirically, by constraining nonsignificant path coefficients to 0, which depends only on relative model fit. To do this, we made use of the differences between chi-square statistics and the information theoretic fit statistics AIC and sample-size adjusted BIC. These statistics indicate preferred models through lower values, and give weight to model parsimony. The social class variables were treated as ordinal.

We used logistic regression to estimate the odds of moving up and down in social class in the participant and offspring generations. For each generation, we defined upward mobility as attaining a higher social class than the participant's parent and downward mobility as attaining a lower social class. Because they could not move up, we excluded those whose social class of origin was Class I from analysis of upward social mobility. Similarly, we excluded those whose social class of origin was Class V from analysis of downward social mobility. The outcome variable for upward social mobility was the dichotomous moved up (1), or stable/moved down (0). We treated downward social mobility analogously. Because variables associated with upward and downward

social mobility could differ by class of origin, particularly when there are overall societal shifts in social class status, we also carried out these regressions for each specific class of origin.

Results

Basic Data

Table 2 shows descriptive statistics for the variables. The changes in mean levels of education and social class are most noteworthy here. The participants' fathers averaged just less than 10 years of education. Participants themselves averaged almost 1 year more (10.79), but their offspring averaged an additional more than three years (13.90). The increase in social class occurred earlier, however: average for the participants was about half a class unit higher than for their fathers, but average for their offspring was nearly identical to their own.

Tables 3 and 4 show the basic matrices of social class data comparing the father's and participant's, and participant's and offspring generations social class attainments. The cells of the matrices show the relevant average participant IQs, along with both the actual numbers of individuals in each cell and (on the diagonals) the numbers expected based on the correlation between social classes across generations. The latter expected numbers provide an indication of the level of stability of social class attainment we would have expected if regression to the mean were the only process creating change in social class status from one generation to the next, given the correlations we observed. The substantial upward social mobility between the father's and participant's generation was clear: 50.7% of the participant generation had moved up relative to their fathers, 22.1% had moved down, and 27.2% had remained stable. In the offspring generation, the lack of overall movement hid substantial individual movement: 31.4% had higher social class attainment than their participant parents, 33.7% moved down, and 33.9% remained stable. Both generational comparisons between actual and expected also showed overall upward movement. Consistent with other studies, participant childhood mental ability was related to social class in all three generations. For example, participants in Social Class III had an average IQ-scaled score of 95.2 and those in IV/V an average of 87.7. Fathers in Social Class II had offspring participants with an average IQ of 105.5 and those in Social Class III had offspring participants with an IQ of 99.5. Offspring in Social Class I had parent participants with an average IQ of 105.6 and those in Social Class II had parent participants with an average IQ of 102.4.

Based on the correlations between social class standings across generations, we would expect movements from one class to another based simply on regression to the mean. Quantifying the extent to which

regression to the mean would have affected the social class standings in each generation can help in interpreting the existence of other social forces. We therefore estimated both the actual mean social class levels for participants in each social class of origin and the expected means given the correlation across generations alone. We also did this for offspring. The results are shown in Table 5. The existence of overall upward class mobility in the participants' generation is clear. In the offspring generation, actual results were extremely similar to those expected, suggesting few, if any, overall social mobility forces.

Tables 6 and 7 present the matrices of social class attainment with mean participant years of education given in each cell. The pattern was very similar to that for IQ: average years of education increased with social class.

Table 8 shows the correlations among the variables. Education was consistently correlated with social class attainment within all three generations between -.40 and -.48. Participant years of education was correlated .42 with participant childhood mental ability. Despite the inevitable reduction because they applied to different people, the correlations between participant childhood mental ability and father's and offspring years of education probably reflected the changes in opportunities for education over the three generations. The correlation between father's years of education and participant childhood mental ability was .06 (*ns*), while the correlation between offspring years of education and participant childhood mental ability was .29, indicating that in recent years education was likely more closely tied to ability than in the past. Participant social class was correlated -.38 with participant childhood mental ability. The correlations between childhood mental ability and father's and offspring social class were lower as would be expected. They were, however, very consistent with each other at -.21 and -.19 respectively. Education was correlated across generations, at .34 between participants' fathers and participants, .40 between participants and their offspring, and .25 between participants' fathers and participants' offspring. Indicative of social mobility, correlations of social class across generations were not as strong: .23 between participants and their fathers, .26 between participants and their offspring, and .18 between participants' fathers and participants' offspring.

Analysis of Social Class Attainment

Figure 1 shows the path coefficients from the most parsimonious path model we fit. Measured against the saturated model, the model shown in Figure 1 had a chi-square difference of 12 on 6 df (p=.06). AIC for the model in Figure 1 was 1,212 less than for the saturated model and sample-size-adjusted BIC was 1,228 less. The resulting model including only the statistically significant paths fit well (RMSEA=.031, 90% confidence

interval .011-.050). It had 6 variables that were treated as outcome variables, on at least intermediate bases. The variables were clearly linked both within and across generations: the predictors for each outcome variable explained substantial proportions of all variable variances. The multiple correlations ranged from 5% for IQ to 32% for participant's years of education. In particular, they were 28% for participant's social class and 26% for offspring social class. In examining Figure 1, keep in mind that the social classes were labeled I-V with the highest class labeled I, so negative coefficients indicated direct associations between higher social class and greater education and higher mental ability. Social class of origin predicted educational attainment in both the participants' and offspring generations, but the associations were not particularly strong. The standardized regression coefficients were -.16 and -.22 respectively. Moreover, fathers' social class was about as important as participants' social class in predicting offspring educational attainment (-.08), an effect across two generations. Educational attainment partially mediated the associations of social class attainments across generations, but social class of origin still had independent effects on both participant's and offspring social class (standardized regression coefficients of .10 in each generation), and father's social class predicted offspring social class at .08, again an effect across two generations. Educational attainment predicted social class in each generation. The association between education and social class was moderate within fathers' and participants' generations (-.37 and -.35), but larger in the offspring generation (-.46), with the differences just barely significant at p=.05. As in the whole SMS 1947, women had slightly higher childhood IQ's than men, and women had higher social class than men in the participant generation. As noted above, this was likely partly due to our use of husband's social class for women where it was higher. There were no sex differences in effects on offspring social class. Finally, participant's childhood mental ability moderately directly predicted both own educational and social class attainments (.37 and -.22 respectively). In addition, participant's childhood mental ability predicted own social class attainment indirectly through educational attainment (-.13).

Analyses of Social Mobility

Table 9 shows the results of the logistic regressions predicting moving up or down in social class status from the fathers' generation to the participants' generation. For the regression predicting upward social class movement, the change in chi-square from the saturated to the presented regression was 1.5 on 3 df (p=.68). AIC was 3.1 less for the presented model and sample-size-adjusted BIC was 7.2 less. For the regression predicting downward social class movement, the change in chi-square from the saturated to the presented regression was .8 on 2 df (p=.67). AIC was 2.4 less for the presented model and sample-size-adjusted BIC was 5.1 less. The

strongest predictor of either upward or downward social class movement was father's social class. This largely reflected possible class movement (and regression to the mean), as lower father's social class was associated with moving up and higher father's social class was associated with moving down. In keeping with the overall upward social class movement, social class was a stronger predictor of upward than downward movement. Participant's childhood IQ and educational attainment were also strongly associated with the odds of moving both up and down in social class. More highly educated mother than father had suppressor effects on the odds of moving both up and down: in both regressions the coefficients of these variables were not significant, but they could not be dropped from the regression equation without significant deterioration in the model fit statistics. Possibly explaining the sex difference in social class attainment, women were somewhat less likely to move down in social class than men. In part, this likely reflects the greater overall tendency for women to occupy Class IIIN (nonmanual) positions and men to occupy Class IIIM (manual) positions.

The results of the logistic regressions predicting moving up or down in social class from the participants' to the offspring generation are also shown in Table 9. For the regression predicting upward social class movement, the change in chi-square from the saturated to the presented regression was 3.6 on 5 df (p=.61). AIC was 2.9 less for the presented model and sample-size-adjusted BIC was 4.9 less. For the regression predicting downward social class movement, it was not possible to drop any independent variables without significant loss of fit. Again, the strongest predictor of either upward or downward social class movement was parent's social class (which in this case was participant's social class) and this largely reflected possible class movement and regression to the mean. There were even carry-over effects of this kind from these people's grandfathers, or the participants' fathers. For this generation, moreover, the effect of social class on downward social movement was as strong as the effect on upward movement, consistent with the overall essentially equal rates of upward and downward movement. Offspring educational attainment was also strongly associated with the odds of moving both up and down in social class. There were several suppressor effects involving variables associated with these people's parents: as indicated by the fact that in both regressions the coefficients of these variables were not significant, but they could not be dropped from the regression equation without significant deterioration in the model fit statistics. Though there was no sex difference in social class attainment in this generation, women were again somewhat less likely to move down in social class than men.

Because there was clearly overall upward social mobility, we also separately examined the predictors of moving up and down from each social class for those classes with sufficient data to do so. This of course

considerably reduced the power to detect associations, so most of the effects we had observed for the full sample were not significant in these restricted subsamples. Table 10 shows the results. Because of the lack of statistical significance, it is difficult to take the odds ratios at face value. It might be hypothesized, however, that for participants age 11 IQ was relatively more important than education in movement from Class II to Class I, while the reverse was true in movement from Class III to Class II. Downward movement from Class II appeared to be more dependent on education than downward movement from Class I in both the participant and offspring generations, but upward movement from Class II appeared to be more dependent on education than was upward movement from Class III in the offspring generation. Of course, we did not have an early life IQ measure in the offspring generation.

Comparison with LBC1921

Johnson, Brett, and Deary (2009) carried out a similar analysis of the roles of educational attainment and childhood ability in predicting social class attainment and social class mobility in the three generations including and surrounding the LBC1921. They made use only of the men in this cohort because of the tendency for women to have remained outside the workforce after marriage or the births of children, and the full recruited cohort was smaller. Thus the group participating in that LBC1921 study was much smaller than this one (N=238), and we had much greater power to detect effects in the LBC1936. In particular, Figure 1 shows several small effects transmitted across two generations in LBC1936 that were not detected in LBC1921. It is inappropriate to conclude that such effects were not present in LBC1921.

That said, there were two effects that differed significantly in the two cohorts. Both involved stronger effects in LBC1921 than in LBC1936. Father's social class had a significantly stronger effect on participant's childhood IQ (-.63 vs. -.21, $p<.01$), as did father's social class on participant's years of education (-.59 vs. -.16, $p<.001$). Several other effects were stronger in LBC1921 than in LBC1936 but the differences were not statistically significant. The effects of father's social class on offspring years of education (-.47 vs. -.24), of participant's social class on offspring years of education (-.49 vs. -.22), and of offspring years of education on offspring social class (-.73 vs. -.46) were noteworthy. All suggest greater social mobility over time. There were similar differences between the two cohorts in the odds of moving up and down in social class, all indicating somewhat stronger effects in LBC1921 than in LBC1936. None of these differences was statistically significant.

There were, however, differences in the proportions that moved up and down in social class both within the generations in each cohort and between the two cohorts. Consistent with the generally observed slowing of

overall upward movement in the later part of the twentieth century (but not with an overall slowing of social mobility) due to saturation of the new more service-oriented labor market, there was more downward movement among the LBC1936 participants than among the LBC1921 participants (chi-square=81.46 on 2 df, $p<.001$). There was also more upward and less downward movement among the LBC1936 participants than among the offspring of the LBC1921 participants (chi-square=241.95 on 2 df, $p<.001$ on proportions), reflecting activity in roughly the years 1956 to 2001 as compared to activity in roughly the years 1970 to the present. Moreover, there was less upward movement but more downward movement among the offspring of the LBC1936 participants than among the participants themselves (chi-square=127.11 on 2 df, $p<.001$), reflecting activity in roughly the years 1980 to the present as compared to activity roughly in the years 1956 to 2001. Consistent with expanding social mobility – both upward and downward -- at the turn of the century, there was more upward as well as downward movement among the offspring of the LBC1936 than among the offspring of the LBC1921, though the difference was not significant (chi-square=3.78 on 2 df, *ns*).

Discussion

In this study, we investigated the roles of the psychological characteristics of mental ability and educational attainment in both social class attainment and social mobility in the Lothian Birth Cohort 1936, with the two purposes of describing the associations among social class and the psychological variables of mental ability and educational attainment within and across generations and comparing these associations to those from an older cohort. More specifically, our findings were unusually valuable because we had three generations of social class and education data, along with childhood mental ability data for the middle generation. Their value was increased, moreover, by the ability to compare our results with those from the similarly assessed and recruited Lothian Birth Cohort 1921. This made it possible to evaluate the contributors to social class attainment and social class mobility throughout the twentieth century. We concluded that, overall, though the strong trend toward upward social mobility that took place in the middle of the twentieth century appears to have levelled off, there is some indication that overall social mobility has actually increased in recent years, consistent with the observations of Goldthorpe and Jackson (2007) for Britain as a whole, and Iannelli and Paterson (2006) for Scotland in particular. As they noted as well, this means, of course, both upward and downward social mobility. Moreover, there was some evidence in our data for weakening influences of social class of origin and educational attainment on individual social class attainment.

Our study was unusual among studies of social mobility in that we had access to a measure of childhood mental ability at least for the middle generation in our three-generation study. Our results were very consistent with those of prior studies (Bajema 1968; Burt 1961; Duff & Thomson, 1923-24; Gibson 1970; Higgins 1961; Herrnstein & Murray, 1994; Jencks 1979; Waller 1971; Young and Gibson 1963) in showing that both social class attainment and social mobility were influenced by pre-existing levels of mental ability. Though estimates of actual effects vary from study to study, indicating dependence on specifics of time and place, the role of individual-level mental ability in driving pursuit of educational attainment is well documented. Of course, for many professional positions, specific educational credentials are required, and educational attainment clearly contributes to social class attainment as well, but one mechanism through which this occurs is through the contribution of mental ability to educational attainment. Moreover, mental ability makes a contribution to social class attainment independent of educational attainment. This indicates that, even when educational attainment is blocked, individuals of higher mental ability manage to make use of that ability to work their ways up corporate and administrative structures to positions of status and authority.

Study Limitations

Despite the broad perspective made possible by the novelty of our data, our study was subject to several limitations that should be kept in mind in the discussion of those findings that follows. The primary limitation of the data is that, with the exception of childhood mental ability, all were reported by or assessed in the middle generation at about age 70. This means that reports of fathers' education and occupation were subject to the sometimes limited understanding by children of adult activities as well as the inaccuracies and biases of long-term recall, and the reports of offspring education and social class attainment were subject to the usual sources of inaccuracy involved in elderly people's reports of information about people other than themselves. Moreover, the time ordering of the concepts represented by our variables made only a single model reasonable for these data. Within this model, there could be many possible causal explanations for the associations among the variables, but we had no means to distinguish among these possibilities in these data. In addition, we had to make some of the social class assignments judgmentally, as the job titles given by some of the participants for themselves or their relatives were not listed in the classification manuals. Finally, it would have helped greatly to clarify the underlying role of childhood mental ability in the associations between education and social class across the generations if childhood mental ability data for the fathers' and offspring

generations had been available. Still, having three generations of education and social class data is rare, and having childhood mental ability data even for a single generation in such a study is even rarer.

The sample used in this study was of somewhat higher childhood mental ability than the overall population. Because the childhood mental ability scores were derived from the unique Scottish Mental Survey (SMS) of 1947 which tested almost the whole Scottish 11-year-old school population, it is possible to evaluate this directly. The average score in the LBC1936 was 0.78 standard deviation higher than the overall population average, and the resulting variance in childhood IQ scores was restricted by 44%. This may at least partly contribute to the overall upward movement in social mobility we observed. Correcting for this restriction of range adds .02 to .03 to each regression coefficient shown in Figure 1. As range was also restricted in LBC1921 for similar reasons, our comparisons between the two cohorts should be relatively unaffected. Our findings are of course rooted in the particular place and times in which the samples were ascertained, and other samples from other places may show different results.

All the variables we used in this study were both highly intercorrelated and emerged as results of many different and more primary developmental processes and social factors that we were not able to measure directly. Unpacking these more primary processes is ultimately necessary if we wish to understand the relations among these variables fully. In addition, the relative contributions to social class outcomes made by the variables we considered were dependent on the variables' reliabilities. Korenman and Winship (2000) noted, in their analyses of the NLSY data, that measures of mental ability seemed to be more reliable than measures of social background. This is likely to have been the case in our data as well. Finally, we made use of social class data for LBC1936 women, even though many remained out of the workforce after marriage or the birth of children. To compensate, we used husband's social class attainment for married women when it was higher than the woman's own. This has at best to be considered a rough estimate of the actual social class these women would have attained had they pursued career development as freely as their male peers. We believe that this is likely the main reason that we observed higher average social class attainment in the female LBC1936 participants than in the males.

Like all studies of social mobility, our results must be considered specific to the time and place in which they were observed: Scotland in the second half of the twentieth century. This is particularly true of the specific magnitudes of the associations we observed over the general pattern of the existence of associations. Our comparison of the results of this study focusing on the LBC1936 to those of the LBC1921 emphasizes this point.

It would be interesting to know to what degree results are specific to time as opposed to place through similar studies in other places that can compare results over time, particularly if they could compare results across time periods similar to those in this study. The general observation here that intelligence contributes to social mobility, however, is very consistent among the many studies of this subject that have been conducted (Strenze, 2007).

Our Results in Perspective

The indicated roles of childhood mental ability, social class of origin, and educational attainment in the LBC1936 were very consistent with those of other studies from this time period in Britain and other western nations. Because our sample was larger than many and spanned three generations, we were able to pick up transgenerational associations that were not available to other studies. In particular, our data made clear that intergenerational transmission of educational attainment was one of the key ways in which social class was maintained within families. We could observe this because educational attainment mediated the associations between social class of origin and attained social class in both generations, and also because there were direct transgenerational associations of educational attainment that were at least as strong as the transgenerational associations of social class. Moreover, there was some evidence that the intergenerational transmission of educational attainment was increasing in strength over time. In the one generation in which we had childhood mental ability data, these data also mediated the association between social class of origin and educational attainment.

As noted above, our variables had a clear ordering in time that made only a single model that measured the extent of associations from generation to generation reasonable. This does not mean that the predictive associations we observed should be considered directly causal. For example, fathers' social class may not have *caused* participant's childhood IQ. The more likely reason for the association is that both genetic and environmental influences on father's mental ability contributed to both father's social class and participant's mental ability. We had no way to test this explanation in these data. If this explanation is correct, however, the process could be an example of the intergenerational transmission of social class attainment through coevolution. Social class carries with it aspects of culture, and coevolution is the process by which biological and cultural factors reinforce each other in transmitting culturally influenced behaviours and attitudes from one generation to the next through modification of natural selection pressures (Cavalli-Sforza and Feldman 1981; Durham 1979). It is thus a form of gene-environment correlation. When gene-environment correlation is operative, the individual seeks out and evokes environmental experiences that are compatible with genetically

influenced traits, thus selecting an adaptive niche within broader groups of individuals (Johnson, 2007). Natural selection comes into play when those most genetically suited to a cultural milieu are also most successful in transmitting their genes to the next generation. The coevolutionary process is facilitated in most social groups because parents transmit both genes and culturess to their offspring.

Coevolutionary processes have been extensively documented in humans and non-human animals (Laland, et al. 1995). For example, it is believed that the culturally transmitted process of domesticating cattle and developing dairy and cheese-making activities that took place over generations altered the environments of self-selected groups of humans sufficiently to select for genes that confer greater lactose tolerance today (Aoki 1986). By definition, culture entails some collection of transmission systems that make possible an extra-genetic inheritance system based on knowledge (Cavalli-Sforza & Feldman 1981). The knowledge often involves social learning (language, values, technology, standards of conduct). Ability to make use of this knowledge may be associated with reproductive success (Betzig, et al. 1988; Chagnons & Irons 1979), suggesting genetic involvement in the transmission of cultural processes. With respect to intergenerational transmission of mental ability, educational attainment, and social class, genetic involvement in the transmission of cultural processes may take place through both genetic and cultural transmission of intelligence, as well as propensities to obtain particular levels of education and to pursue particular kinds of occupations. It may also take place through genetic transmission of propensities to parent in ways that teach offspring attitudes involving pursuit of education and occupation. Johnson, McGue and Iacono (2007) have documented results consistent with these processes. We emphasize that, to whatever degree natural selection (reproductive success) may be involved in genetic propensities and cultural traditions regarding social class attainment, likely it may involve matching mental ability to social class attainment rather than maximizing mental ability and educational and social class aspirations.

Our results were consistent with those of other studies in documenting a surge in upward social mobility in the middle of the twentieth century that tapered off at the end of the century. This surge in upward social mobility was accompanied by a surge in overall levels of education, which rose by almost four years across the three generations in these data. Of course this reflects changes in the mandated school-leaving ages over the period (which were 14 from 1901-1947, 15 from 1947-1973, and 16 thereafter) as well as changes in individuals' abilities to obtain post-secondary education. While relative individual level of education is clearly one of the drivers of upward social mobility and relative individual educational failure is clearly one of the drivers of downward social mobility (Blanden, Gregg and Machin, 2005; Burt, 1961; Deary, et al. 2005; Goldthorpe and

Mills, 2004; Johnson, Brett and Deary, 2009; Korenman and Winship 2000), our data here suggest that increased overall levels of education may weaken the effects of both educational attainment and mental ability on social class attainment. This deserves further attention in the debate in Britain surrounding the desirability of increasing social mobility.

It may also be one of the reasons for the suppressor effects we observed, particularly in the regressions of upward and downward social mobility in the offspring generation. Suppressor effects occur when there is substantial multicollinearity among contributing variables, only some of which is actually related to the outcome variable. Each variable acts in the regression equation to remove common variance that is irrelevant to the outcome variable, thus enhancing the effect of any collinear contributing variable to the outcome variable. In our data, father's social class, childhood IQ, and participant years of education appeared to act in this manner with respect to the other variables in predicting offspring social mobility. This is the kind of situation that could occur if both social class and years of education increased relatively uniformly across the generations, yet their effects on offspring social class did not increase similarly.

At the same time, our results suggest that social mobility has certainly not decreased in Britain in recent years, and may in fact have increased. The LBC1936 offspring may not have reached their ultimate social class attainment, but, to date, it appears that they have both more upward and more downward social mobility than the offspring of the LBC1921, though the difference was not significant. The overall upward social mobility that took place in the middle of the twentieth century had its roots in post-World War II economic recovery and the expansion of the technological and service industries at the expense of the manufacturing industries. Such social structural changes will generally not be maintained indefinitely. This means, when they are complete, that emphasis on high social mobility will entail high rates of downward as well as upward social mobility. This must be taken into consideration in evaluating the merits of encouraging high social mobility.

In conclusion, we examined how the psychological factors of mental ability and educational attainment contributed to social class attainment in three generations spanning most of the twentieth century in Britain. Relative transmission of social class decreased for the 1936 cohort relative to the 1921 cohort, while relative transmission of educational attainment increased. Effects of childhood IQ and educational attainment decreased, apparently due to relative decrease in overall upward mobility and absolute increase in overall education level. Though the youngest generation had not yet necessarily reached ultimate social class attainment, comparisons with their own parents and a similar cohort fifteen years older suggested that both upward and downward social

mobility have if anything increased in Britain in recent years. This should be investigated in other samples from other areas of the world as well.

Footnotes

[1]Though their usage has become accepted, Little & Rubin's (1987) definition of the term 'missing at random' is somewhat misleading. They distinguish it from 'missing completely at random' or the situation where data that are missing for some variable are independent of any of the other variables of interest as well as of the variable itself. Data that are missing at random may be so dependent on other variables of interest, but may not be missing dependent on the value of the variable itself. For example, special education students may tend to get lower scores on achievement tests and may be more likely to be absent from school on any selected testing date. Their data may still be missing at random as long as the process generating their absence that day is not related to the process generating the achievement test scores they would have gotten. In our case, the most common reason for missing data was lack of offspring, with lack of knowledge about parental education and occupational status a very distant second. There was no reason to suspect that missing data were associated with the processes that generated the information that was not provided.

[2]Violations of normality of distribution of variables can render standard errors and model-fitting criteria inaccurate when full information maximum likelihood estimation is used, though these biases are generally less than those involved in ad hoc missing value techniques such as listwise deletion (e.g., Enders, 2001). Our variables, however, did not deviate substantially from normality (e.g., for the important social class outcome variables, skewnesses were .01, .23, and .38 for participants, fathers, and offspring, respectively. Kurtoses were -.88, .48, and -.23, again respectively. Moreover, full estimation weighted least squares and generalized least squares estimation yielded identical results.

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Table 1: Percentages of social class attainment by sex for participants in the LBC1936 Study

Class		Male		Female	
1		17.6		17.9	
2		34.9		40.3	
3	3*	12.1	40.3	34.1	40.9
3.5		28.2		6.8	
4	4*	6.3	7.2	0.7	0.9***
5		0.9		0.2**	

* Collapsed classes

** χ^2 on 5 df = 154.3; **p = .000**

*** χ^2 on3 df = 27.9; **p = .000**

Table 2
Descriptive Statistics

	Minimum	Maximum	Mean	Standard Deviation
Childhood home deprivation index	-.83	2.91	.00	.55
Father's years of education	.00	23.00	9.96	2.24
Difference in parents' education	-11.00	10.00	.01	1.79
Father's social class	1.00	5.00	2.91	.94
Participant's age 11 IQ	38.48	129.88	100.00	14.99
Participant's years of education	7.00	14.00	10.74	1.13
Participant's social class	1.00	5.00	2.40	.91
Participant's age 70 environment	1.00	8.00	6.25	2.09
Offspring's years of education	.00	29.00	13.90	3.23
Offspring's social class	1.00	5.00	2.43	.87

Table 3

Mean IQ by Father's & Participant's Social Class for Participants in the LBC1936 Study*

Father's	Participant's social class				
social class	I	II	III	IV/V	ALL**
I	109.3 (21)	109.6 (27)	102.7 (12)	115.6 (1)	108.2 (61)
	12.8	11.5	13.0	--	12.3
II	111.8 (51)	106.7 (80)	94.5 (40)	103.0 (2)	105.4 (173)
	9.1	10.6	14.7	7.5	12.9
III	106.6 (73)	101.6 (181)	96.6 (225)	89.2 (19)	99.6 (498)
	11.3	14.1	14.2	13.4	14.3
IV/V	110.3 (20)	98.9 (56)	94.0 (72)	83.6 (10)	97.1 (158)
	9.2	14.8	15.0	12.9	15.4
ALL**	109.0 (165)	103.0 (344)	96.0 (349)	89.1 (32)	100.9 (890)
	10.8	13.6	14.4	14.1	14.5

Note: N in parentheses and standard deviation below.

* at age 11

** Excluding those missing data on father's social class

Table 4

Mean IQ by Participant's & Offspring's Social Class for Participants in the LBC1936 Study

Participant's	Offspring's social class				
social class	I	II	III	IV/V	ALL*
I	108.6 (34)	109.7 (79)	106.9 (25)	100.9 (6)	108.6 (144)
	12.6	9.7	12.8	14.9	11.3
II	106.1 (31)	104.0 (154)	101.4 (81)	98.5 (20)	103.1 (286)
	11.3	11.6	15.7	13.0	13.0
III	101.9 (21)	96.5 (122)	97.0 (117)	92.3 (27)	96.7 (287)
	7.6	14.9	14.9	15.3	14.0
IV/V	67.4 (1)	88.9 (6)	88.6 (12)	91.4 (7)	88.6 (26)
	--	15.8	14.1	12.3	13.9
ALL*	105.6 (87)	102.5 (361)	99.1 (235)	95.1 (60)	101.2 (743)
	11.9	13.5	14.7	14.3	14.0

Note: N in parentheses and standard deviation below.

* Excluding those missing data on offspring's social class

Table 5
Actual and Expected Social Class for Participants in LBC1936 and their Offspring

Class of Origin	Actual Mean	Expected Mean
Participant - Class I	1.89	2.47
Participant - Class II	1.97	2.70
Participant - Class III	2.40	2.93
Participant - Class IV/V	2.49	3.28
Offspring - Class I	2.04	2.04
Offspring - Class II	2.35	2.27
Offspring - Class III	2.57	2.57
Offspring - Class IV/V	3.10	2.95

Table 6

Mean Years of Participants' Education by Father's & Participant's Social Class for Participants in the LBC1936 Study

Father's	Participant's social class				
social class	I	II	III	IV/V	ALL*
I	12.3 (22)	11.4 (29)	11.1 (14)	12.0 (1)	11.7 (66)
	1.1	1.1	1.3	--	1.2
II	11.8 (53)	11.5 (86)	10.6 (44)	10.0 (2)	11.4 (185)
	1.0	1.1	1.1	0.0	1.2
III	11.4 (77)	10.8 (191)	10.2 (238)	10.3 (20)	10.6 (526)
	1.2	1.1	0.7	0.8	1.0
IV/V	11.1 (20)	10.5 (58)	10.0 (75)	9.9 (11)	10.3 (164)
	1.1	1.0	0.6	0.3	0.9
ALL*	11.6 (172)	11.0 (364)	10.3 (371)	10.2 (34)	10.8 (941)
	1.2	1.2	0.8	0.7	1.1

Note: N in parentheses and standard deviation below

** Excluding those missing data on father's social class

Table 7

Mean Years of Participants' Education by Participant's and Offspring's Social Class for Participants in the LBC1936 Study

Participant's	Offspring's social class				
social class	I	II	III	IV/V	ALL*
I	12.0 (35)	11.5 (81)	11.7 (27)	11.3 (6)	11.6 (149)
	1.1	1.1	1.3	1.5	1.2
II	11.3 (34)	11.1 (162)	10.6 (86)	10.7 (21)	10.9 (303)
	1.2	1.2	1.1	1.1	1.2
III	10.4 (23)	10.3 (130)	10.2 (122)	10.2 (31)	10.3 (306)
	1.0	0.7	0.8	0.7	0.8
IV/V	10.0 (1)	10.0 (7)	10.1 (13)	10.0 (7)	10.0 (28)
	--	--	0.6	--	0.4
ALL*	11.3 (93)	10.9 (380)	10.5 (248)	10.4 (65)	10.8 (786)
	1.3	1.1	1.1	1.0	1.1

Note: N in parentheses and standard deviation below

* Excluding those missing data on offspring's social class

Table 8

Correlations Among the Variables Assessed - Pearson's

	Father's social class	Father's education (yrs)	Parents' difference in education	Participant's Age 11 IQ	Participant's education (yrs)	Participant's social class	1st offspring's social class	1st offspring's education (yrs)
Father's social	1.00							
class	N = 960							
Father's	-.40	1.00						
education (yrs)	N = 822	N = 826						
Parents' difference	-.10	.46	1.00					
in education	N = 811	N = 815	N = 815					
Participant's	-.21	.06	-.01	1.00				
age 11 IQ	N = 908	N = 779	N = 770	N = 1028				
Participant's	-.35	.34	-.04	.42	1.00			
education (yrs)	N = 960	N = 826	N = 815	N = 1028	N = 1091			
Participant's	.23	-.18	.01	-.38	-.45	1.00		
social class	N = 941	N = 809	N = 798	N =1008	N = 1070	N = 1070		
1st offspring's	.18	-.06	.01	-.19	-.23	.26	1.00	
social class	N = 799	N = 697	N = 687	N = 760	N = 804	N = 786	N = 804	
1st offspring's	-.26	.25	.02	.29	.40	-.37	-.48	1.00
education (yrs)	N = 816	N = 713	N = 703	N = 777	N = 823	N = 805	N =800	N = 823

Table 9
Odds ratios for social mobility of participants and their offspring for both the LBC1936 and LBC1921

	Participant moved up		Participant moved down		Offspring moved up		Offspring moved down	
	1921	1936	1921	1936	1921	1936	1921	1936
Father class	16.96 (2.89)	7.53 (.19)	.15 (.05)	.20 (.18)		.86 (.14)		1.29 (.11)
IQ aged 11	3.03 (.85)	1.60 (.11)		.59 (.13)		.92 (.15)		1.19 (.14)
Years education	2.58 (.84)	2.08 (.12)	.26 (.06)	.40 (.15)				.82 (.12)
Parents' difference in ed	N/A	1.04 (.10)	N/A	.93 (.10)	N/A		N/A	.96 (.11)
Sex	N/A		N/A	.24 (.23)	N/A		N/A	
Father's education			1.82 (.91)			.58 (.19)		1.36 (.13)
Participants' social class					31.03 (6.35)	15.09 (.25)	.16 (.03)	.18 (.16)
Offspring's education					3.54 (1.09)	3.25 (.18)	.40 (.13)	.42 (.14)
Offspring sex								.64 (.21)

Note: Standard errors in parentheses. Parameters for LBC1921 are from Johnson, Brett, & Deary (2009).

Table 10
Odds Ratios for Social Mobility for Specifc Classes for Participants in LBC1936 and their Offspring

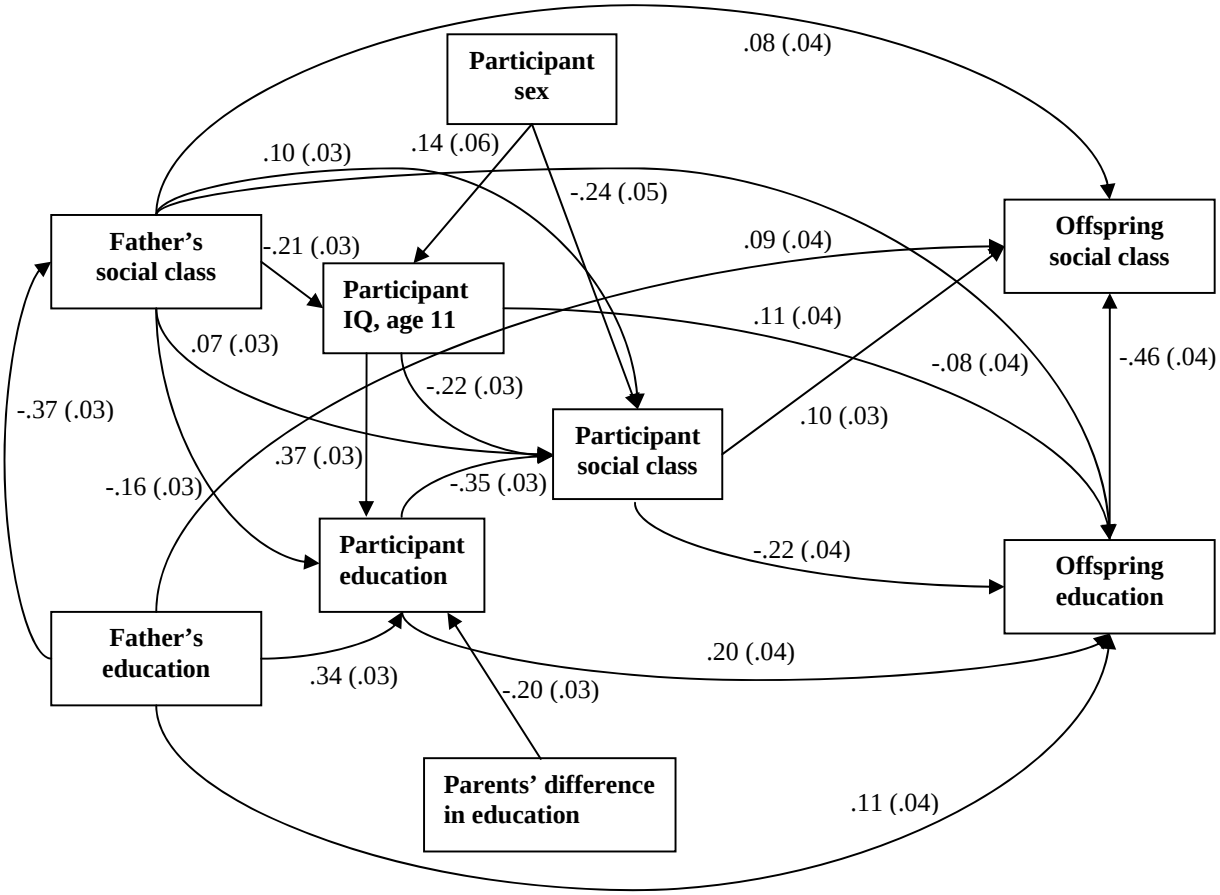
	Father Class	Father's Education	IQ Aged 11	Years of Education	Parents' Education Difference	Sex	Offspring Education	Offspring Sex
P'pant Up from Cl. II	N/A	1.26(.20)	2.87(.32)	1.29(.22)	1.05(.17)	.72(.40)	N/A	N/A
P'pant Up from Cl. III	N/A	1.16(.17)	1.48(.13)	2.25(.15)	.85(.17)	1.12(.21)	N/A	N/A
P'pant Down from Cl. I	N/A	.31(.45)	1.23(.49)	.31(.45)	1.00(.26)	.23(.79)	N/A	N/A
P'pant Down from Cl. II	N/A	.79(.30)	.23(.35)	.61(.27)	.91(.23)	1.51(.46)	N/A	N/A
P'pant Down from Cl. III	N/A	1.78(.32)	.82(.29)	.58(.41)	.89(.44)	.07(1.048)	N/A	N/A
Offsp'g Up from Cl. II	.61(.27)	.50(.37)	.84(.35)	.83(.28)	.77(.26)	N/A	5.47(.34)	.32(.54)
Offsp'g Up from Cl. III	.89(.26)	.75(.43)	.99(.28)	1.02(.44)	1.03(.77)	N/A	2.46(.36)	2.88(.77)
Offsp'g Down from Cl. I	1.20(.23)	.89(.21)	1.24(.32)	.91(.23)	1.25(.16)	N/A	.51(.26)	.70(.43)
Offsp'g Down from Cl. II	1.26(.17)	2.01(.23)	1.21(.20)	.67(.18)	.81(.18)	N/A	.28(.23)	.95(.31)
Offsp'g Down from Cl. III	2.05(.35)	1.67(.38)	.74(.38)	2.13(.36)	.90(.35)	N/A	.21(.54)	.76(.35)

Note: Data for other class movements were too thin to provide reliable estimates. Standard errors are in parentheses.

Figure Caption

Figure 1 – Results of the three-generation structural equation model, showing standardized regression coefficients for continuous variables were standardized for both dependent and independent variables. Standard errors are in parentheses.

Figure 1.


Participant sex
.08 (.04)
.10 (.03)
.14 (.06)
-.24 (.05)
Father's social class
-.21 (.03)
Participant IQ, age 11
Offspring social class
.09 (.04)
.11 (.04)
.07 (.03)
-.08 (.04)
-.46 (.04)
-.37 (.03)
-.22 (.03)
Participant social class
.10 (.03)
.37 (.03)
-.16 (.03)
-.35 (.03)
Participant education
-.22 (.04)
Offspring education
Father's education
.20 (.04)
.34 (.03)
-.20 (.03)
Parents' difference in education
.11 (.04)